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FOR A FRAMEWORK CONVENTION ON CLIMATE CHANGE

EXECUTIVE SUMMARY OF THE NATIONAL COMMUNICATION OF

DENMARK

submitted under Articles 4 and 12
of the
United Nations Framework Convention on Climate Change

In accordance with decision 9/2 of the Committee, the interim secretariat is to make available, in the official languages of the United Nations, the executive summaries of the national communications submitted by Annex I Parties.

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Copies of the Danish national communication can be obtained from:

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DENMARK

Basic data

1. In 1990 the population of Denmark amounted to 5.2 million inhabitants and with a total area of 43.000 km^2 the population density corresponds to approximately 120 inhabitants/km^2. Only a very slight increase in the population is envisaged.

2. Denmark is situated at about 55° Northern latitude and about 10° Eastern longitude. Due to the continental landmass and the warm Gulf stream, the temperature in Denmark is, especially during the winter, relatively high. The weather can in general terms be described as temperate west coast climate with mild winters and cool summers. The average temperature is 8°C and the ground surface receives yearly between 500 and 900 mm of precipitation.

3. Two thirds or 64%, of the area is cultivated agricultural land, approximately 15% is classified as built-up areas and forests account for 10%. Natural areas like moorland, marshland and lakes make up the remaining 10%. The dominating agricultural crop, grain, covers approximately 15,000 km^2 of the Danish landscape.

4. The service sector, market and Government contribute approximately 70% of the Gross National Product - amounting to US$ 129,000 billion in 1990 or US$ 25,000 per capita. In 1990 the GNP increased by 63% compared with 1970.

5. Primary energy consumption increased rapidly in the 1960s but has essentially been stabilized at a level of 750 PJ from 1972 to 1992 as a result of the saturation effect, the two oil crises and the implementation of rigorous energy political instruments during the last 15 years.

6. Oil was replaced by coal, especially for power production and the oil consumption was reduced significantly due to energy savings and changes in consumption and supply system, e.g. introduction of combined heat and power.

7. In 1990 the distribution on energy sources of the total primary energy consumption of 768 PJ was Coal: 41%, Natural Gas:11%, Oil products: 41% and Renewable: 7%.

8. Energy taxes have been implemented on fossil fuels and electricity, especially in the household sector, and the ensuing energy savings in this sector is a strong indication of the efficiency of high energy prices as an instrument to lower the energy consumption.

9. After a recent energy taxation reform, a rather elaborate system of taxes has been replaced by a combined energy and CO_2-tax, with a level for private households of US$ 16 per tonne of CO_2, or approximately US$ 6 per GJ. Industry and service only pay CO_2 tax at a level which is half of the tax for households. Renewable energy is not taxed.

10. The number of passenger cars has increased by 48% in the period 1970 to 1990, and accordingly the road transport for cars shows a growth rate of 73% from 29.8 billion person-km

to 51.5 billion person-km. The transport of goods shows also a slightly lesser increase of 30% for the period from 8.2 billion transport-km to 10.7 billion transport-km.

11. According to traffic prognoses the authorities envisage an increase by the year 2010 of 40% and 60% for passenger and goods transport respectively compared with 1990.

Emissions and uptake

12. The basis of the calculation of emissions of greenhouse gases from the energy sector is primary energy consumption and emission factors. For the other sectors activity data and estimated national emission factors are used. The tables are produced in accordance with the latest version of the IPCC manual for emission inventories, and the figures are aggregated in categories consistent with the manual.

Carbon Dioxide

13. Since the Second World War the development in the emission of CO_2 is showing a very significant trend. In the period from 1945 to 1960 with a rather slow economic development the emission increased from 12 million tonnes to 26 million tonnes, or approximately 1 million tonnes per year. From 1960 to 1972, a period with full steam on the economy, the emission was growing from 26 million tonnes to 62 million tonnes corresponding to a growth rate of 3 million tonnes per year.

14. After the so called energy crisis in 1973 and up to present the emission of CO_2 has due to an active energy management been levelling around 60 million tonnes despite a constant economic development. In the same period the GNP increased by approximately 60%. The variation from year to year is mainly caused by import/export of electricity from the two other Scandinavian countries.

15. The main sources for CO_2 emissions are power plants and transport, with a share of 50% and 20% respectively.

16. The Danish Parliament has decided that during a period of rotation, e.g. 80 - 100 years, the forest area should be doubled. This decision implies an afforestation rate of about 40 km^2/year, corresponding - at its highest level - to a CO_2 fixation rate of approximately 1 million tonnes C per year or 5% of the yearly CO_2-emission.

17. Since no common international agreement has been reached on the methodology on determination of the CO_2-uptake in afforestation programmes the uptake has not been included in the Danish emission inventory but is listed separately.

Methane

18. The yearly anthropogenic emission of methane amounts to about 406,000 tonnes and has not changed through the last decade. Most important is the agricultural sector - enteric

fermentation and animal waste - with 262,000 tonnes corresponding to 65%. Second are emissions from landfills with 120,000 tonnes (30%).

Nitrous oxide

19. The sources to the anthropogenic emission of nitrous oxide are almost completely dominated by the agricultural sector, which accounts for more than 75% of a yearly emission of 11,000 tonnes. The emission rate depends on a complex array of factors like soil structure, pH, temperature, type of crop, water saturation and nitrogen fertilizer. The models for determining the emission are very simplified and their results are encumbered with great uncertainty.

Other GHG

20. The emission of two of three precursors for ozone - NO_x and NMVOC - is regulated within the Geneva-Convention, and for 1990 the emission was estimated at 293 ktonnes and 165 ktonnes respectively. The emission of the third precursor, CO, amounted to 771 ktonnes in 1990.

21. With the aim of phasing out the use of CFC's as fast as possible - at an even faster rate than prescribed by the Montreal-Protocol - the Danish environmental authorities accept HFC's to be used to replace CFC's in some areas. The areas in question are primarily the production of some types of refrigerators and freezers where the assessment of risks and the regulation by the authorities is excluding the use of other substances. In 1990 the use of HFC's was marginal but it has increased to approximately 300 tonnes in 1993.

Vulnerability

22. With a global reduction of the emission of greenhouse gases the development can be slowed down and possibly a new climate equilibrium can be obtained, but it is hardly probable that climate changes can be totally avoided. Without a global effort the climate may change further, but evaluations beyond a century are at present considered almost worthless.

23. It is possible to foresee a series of impacts of climate changes, but it is difficult to estimate their magnitude; sometimes, it may even be impossible to indicate whether they are an advantage or a drawback.

24. If the human influence on the atmosphere proceeds unchanged it may result in climate changes, for Denmark comprising a temperature rise, which by the end of the next century will be about 3°C as a yearly average. It is envisaged that the increase of summer temperature will be a little smaller than the winter temperature, 1-3°C and 2-5°C respectively. At the same time precipitation may increase by up to 10% and the relative sea level rise between 30 and 50 cm.

25. However, it must be assumed that generally the immediate consequences for Denmark in inter alia the agricultural sector, and the management of forests and coast protection within the next century only will be so modest that they can be managed through planned adjustment supported by an expected technological development.

26. A possible exception is the present natural ecosystem where climate changes may be too rapid for some animal and plant species; this may cause temporary instability and in the long run change the composition of species.

27. Denmark is however - ecologically as well as politically and economically - a small open system. The importance of climate changes and sea level rise for the development in the rest of the world may therefore most likely be decisive. The change of climate and the rise of sea level could lead to global economic and political instability.

National programmes

28. Danish policies regarding limitation of climate relevant gases, are rooted in many years of active national policies on energy and environment.

29. The first national energy plan of 1976 together with further development of the policies during the 1980s resulted in a major restructuring of the energy system in Denmark

30. As a result, the total primary energy consumption has essentially been stabilized, despite substantial growth in all economic sectors. In parallel, the environmental impact from the use of energy has been substantially reduced in the same period, as a direct result of the changes in the energy system, as well as introduction of emission standards, emission quotas and other regulations.

31. In the late 1980s, focus was gradually shifted from considerations of security of supply, minimization of energy service costs, and local environmental effects, to wider environmental considerations, notably the goal of achieving long term sustainable developments, on a national as well as on a global level. In 1988, the Danish Government presented its plan of action on environment and development, as a follow up of the recommendations set out in the report from the World Commission on Environment and Development, the Brundtland Report.

32. In 1990 two action plans, relating to energy and transport, were presented to the Parliament. In these plans, limitations of greenhouse gas emissions, notably carbon dioxide, were introduced as explicit targets.

33. In 1992 the objectives of the Danish waste policy were described in the Danish Government's Action Plan for Waste and Recycling 1993-97. Among the objectives of the plan was minimization of deposition of organic material in landfills and energy saving through recycling. A consequence of the plan will be a reduction of the emission of methane from landfill sites.

34. In the Energy Action Plan, the Government listed a number of new initiatives to be implemented, with the expected result of achieving a reduction in CO_2 emissions of 28% in 2005 compared to 1988 levels, for the whole energy sector excluding transport. The Plan was dealt with in the Parliament and there was broad political backing for it.

35. Strategically speaking, the action plan emphasized efficiency improvements in end use, especially in the use of electricity, and increased efficiency of the energy supply systems, notably increased use of combined heat and power, as the most important areas of intervention.

36. The transport action plan, adopted in May 1990 by the Government, had as targets for the CO_2 emissions of the sector, to achieve a stabilization in 2005, and to achieve a 25% reduction by 2030 compared to 1988.

37. The combined effects of the two action plans were foreseen to be more than a 20% reduction in 2005, compared to the base year of the plans (1988). This target was subsequently approved by the Parliament.

38. Apart from this national CO_2 reduction target Denmark has committed itself to stabilize emissions at the 1990 level in 2000 within the framework of the Climate Convention, as well as to achieve a 5% reduction in 2000 compared to 1990, as a contribution to the overall stabilization by the year 2000 for the countries of the European Union (EU).

39. In 1993, the present Government has undertaken a major follow-up of the two action plans, in order to guarantee the achievement of the above targets.

40. In the recent action plan (Follow up on Energy 2000) a revised base scenario for the development of demand and supply, for the energy sector exclusive of transport, has been set up. This base scenario describes the expected development resulting from all measures which will be implemented as a result of implemented policies in place.

41. The analysis shows that the national CO_2 reduction targets would not be met in the base scenario, but fall short by several million t CO_2 in relation to the reduction target of 20% in year 2005.

42. In order to bridge this gap, the Government has launched a packet of initiatives in its action plan "Follow up on Energy 2000", which was published in November 1993.

43. The initiatives are to be implemented through legislation, administrative decisions or negotiations. The content of the packet is a result of extensive screening of a large number of potential options, based on economic and political considerations, and has been thoroughly politically negotiated, to ascertain the necessary parliamentary majority where this is needed.

44. Further more, it is the intention of the Government to increase the use of "green taxes" (taxes on energy, CO_2, water, waste etc.) in all sectors of the economy.

45. As a logical extension of this, Denmark is actively working for the introduction of a combined energy and CO_2 tax within the EU, as well as Community standards for electrical appliances.

46. With the plan in place, a CO_2-reduction of about 23% compared to 1988 levels can be achieved for the energy sector excluding transport. This corresponds to about 18% of the total

CO_2 from energy and transport. Hence additional measures are needed to reach a 20% reduction.

47. In the year 2000, however, the expected reduction will be sufficient to guarantee the fulfilment of a 5% reduction in relation to 1990.

48. The Danish Government intends to review the results of the current plan as well as future initiatives and developments on the international scene on a periodic basis, next time in 1995. Present plans foresee that this revision should include a renewed analysis of the long term options, to update the analysis of the Energy 2000 Plan.

49. The main aim of sustainable transport policy is to promote an efficient transport system for the benefit of the general public and industry, to ensure that the damaging effects of traffic, e.g. pollution and accidents, can be reduced to a minimum in accordance with specified objectives.

50. The target for CO_2 emissions in the transport sector should be seen in relation to the considerable importance attached to helping to solve local environmental problems, which to some extent entails measures which can actually increase CO_2 emissions, e.g. replacing diesel by petrol.

51. The main objectives in the field of waste and recycling are to reduce the quantity of waste arisings, to minimize the environmental impact of waste disposal, and to make use of the resources contained in waste.

52. Today total waste arisings amount to about 10 million tonnes per annum. The objective is that about 50% of the total amount of wastes generated in the year 2000 should be recycled. The remainder should primarily be incinerated and landfilling should be minimized. One of the expected effects of the Plan is a reduction of methane emissions from landfilling.

53. The aim is to incinerate all combustible wastes which is not to be recycled, and which does not present particular incineration problems. By incinerating the energy content in the waste will be used to replace fossil fuels.

54. In connection with incineration, the energy content of non-recyclable wastes should be used effectively like other biofuels, since most of the waste is CO_2-neutral and therefore causes lower CO_2 emissions than burning of fossil fuels.

R & D and systematic observations

55. Denmark contributes actively to international climate research programmes including the World Climate Programme. A main area is the numerical models of the atmosphere. Efforts are directed towards harmonization of the models for weather and climate calculations in order to achieve a uniform model for all problems with a view to enhancing the exploitation of new results of research.

56. The work on climate models includes the study of selected physical processes on the climate and studying the extra-tropical northern hemisphere climate variability. Another important project is the development of a regional model using a high resolution model nested into the global climate model in order to assess regional climate changes caused by an increased greenhouse effect.

57. Climate observations from several Danish stations back to 1872 are available on electronic media, while sea level data are available back to 1890, and sea temperatures back to 1930. A series of data from lighthouses and ships log books from 1675 to 1715 is also included in the data base.

58. The Danish Meteorological Institute (DMI) has been selected as a focal point for a Nordic climate modelling research effort and is collaborating with 11 other European institutes within the European Climate Support Network (ECSN) to promote more effective collaboration in the field of climate monitoring research and prediction. DMI also contributes to climate monitoring within the WMO-coordinated observation programmes (World Weather Watch and World Climate Data Programme).

59. Danish research institutes are heavily involved in the special area of climate research on palaeo-climate, and Denmark has contributed significantly to the European deep drilling project - GRIP - on the summit of the Greenland Ice Sheet. Analyses of the GRIP ice core reveal that climate in Greenland during the last interglacial period was characterized be a series of several cold periods, which began extremely rapidly and lasted for decades to centuries.

International cooperation

60. As a consequence of the global nature of environmental problems Denmark has over the past years intensified action at international level in order to meet the global challenges.

61. The climate problem is to be seen in the context of a broader global challenge. Growing numbers of people have been using up the Earth's store of natural resources. Curbing these trends will require a coordinated international strategy.

62. The awareness of this global challenge and the transboundary nature of the environmental problems were translated into the Danish Government's action plan for sustainable development of 1988, and as a consequence environmental strategies in several sectors have been developed. Plans and strategies will naturally be adjusted in light of the results of UNCED, particularly the Convention on Climate Change, in order to honour the specific obligations.

63. To follow up on UNCED the Danish Government has decided to establish an international environment and emergency fund, the Danish Cooperation for Environmental and Development (DANCED), with the objective of strengthening efforts towards global environmental problems.

64. The United Nations target of 0.7 per cent of GNP in ODA has been reached for many years and the Danish ODA amounts to 1 per cent of GNP by the end of 1993.

65. Denmark wants the GEF to be the financial mechanism for the Convention on Climate Change on a permanent basis, on the condition that GEF is properly restructured.

66. Denmark would have liked to see a threefold increase of the GEF. A replenishment of US$ 2 billion is not sufficient. Denmark will contribute its fair share of GEF 2, but will in addition to that enter into cofinancing arrangements with the implementing agencies.

67. Denmark has since the beginning of the negotiation process contributed to the INC/FCCC special voluntary fund for the participation of developing countries and has been one of the major donor countries to activities in relation to the Convention on Climate Change.

68. Denmark has likewise supported activities in relation to the IPCC Trust Fund.

69. The new strategy under DANCED extends the possibilities of Danish assistance both in general terms to address the comprehensive approach under the Convention, and more specifically to fund country studies pursuant to Article 12 of the Convention.